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## Can You Remember? Factors Predicting Memory Accuracy in Eyewitnesses

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### *Abstract*

*People become witnesses to crimes every day. This study further investigated witness variables such as sex and age, as well as the personality trait conscientiousness, in relation to one's ability to accurately remember a fictional crime scene. An experimental manipulation was also utilized; participants read an article claiming that either men or women were three times better at memory (a self-fulfilling prophecy effect). Then, they watched a short video of a crime and were asked to recall details. As expected, age and memory accuracy were negatively correlated ( $p < .001$ ) and conscientiousness was positively correlated with memory accuracy ( $p = .046$ ). There were no significant differences found among participants based on experimental conditions ( $p = .700$ ), but a main effect of participant sex was marginally significant ( $p = .065$ ), with women having slightly better memories than men. Studying how individual traits relate to memory accuracy can help determine factors that influence eyewitness scenarios and whether juries should rely on eyewitnesses. Implications, limitations, and future research are discussed.*

*Keywords: Eyewitness memory, age, conscientiousness*

When crimes occur, witnesses are an essential part of the investigation and trial procedures. They are interviewed and asked detailed questions about what they experienced and saw. Police, judges, and other officials rely on witnesses' memory to be accurate, and juries find vivid eyewitness testimony extremely persuasive (Leippe, 1985). Unfortunately, eyewitness testimony is not perfect; in many cases, memory is distorted, falsified, or misconstrued. In spite of these flaws, juries find it hard to ignore a confident witness, even when that person's testimony is proven to be useless or irrelevant (Loftus, 2011). The purpose of the current study is to explore factors including age, participant sex, self-fulfilling prophecies, and personality that could have an association with memory accuracy. While extant research has explored each of these variables singly, no published research to date has examined the combination of all four factors together. In addition, this study proposes to explore these variables in a simulated "real world" type of setting – a fictional crime that participants

will witness – to maximize the interplay between ecological validity and the control of an experimental setting.

### **Age and Memory**

Memory capacity and age are negatively correlated (Charness, 1987; Light & Anderson, 1985), and it is more difficult to multitask as people get older. Some researchers suggest there is a general slowing of cognitive processes that comes with aging (e.g., Salthouse, 1994). In addition to physiological challenges, age is related to lack of memory practice. Because older adults have been out of school for so long, they have no need to use strategies that came with school work, and therefore memory becomes generally less efficient and flexible.

While most studies confirm the negative association between memory ability and age, not all studies do. One study showed no differences in reported use of memory strategies (e.g., reminder notes and relating information) or thoughts about how memory works, based on age (Perlmutter, 1978). This

implies that part of the decline older people may see in their memory could actually be due to self-fulfilling prophecies. Merton (1948) defines a self-fulfilling prophecy as, “. . . in the beginning, a false definition of the situation evoking a new behavior which makes the originally false conception come true” (p. 195; as cited in Sutton & Woodman, 1989). Most people already assume memory gets worse with age because it is a common societal conception. In Erber and Rothberg (1991), participants (young and elderly women) read vignettes about a younger or older person forgetting. They were supposed to explain what the cause was of forgetting. Participants claimed the reason for forgetting in the older person was declining memory from age, but for the younger person the reason was lack of effort.

Beyond self-fulfilling prophecies, however, there are several factors that can influence memory in older adults such as mental illness (Niederehe, 1991), medications (Cammen, Simpson, Fraser, Preker, & Exton-Smith, 1987), and health problems (Cutler & Grams, 1988). The influence of self-fulfilling prophecies will be examined further below. From research on general declines in memory based on age, however:

**Hypothesis 1** was that there will be a negative correlation between age and memory accuracy when adults are asked to imagine being in a “real world” type of scenario. Participants were asked to view a fictional crime occur and to act as if they were a bystander witness to this crime. Participants aged 55 or over were specifically recruited, to allow for a wide range of ages to test this hypothesis.

### Participant Sex and Memory

Differences between men and women in terms of memory capacity and ability are

difficult to interpret. Many studies show that men or women are better at specific kinds of memory, but several explanations exist for these differences. For example, some researchers have investigated differences in gender-stereotyped tasks (Ceci & Bronfenbrenner, 1985; Herrmann, Crawford, & Holdsworth, 1992). Expectations can influence a person’s effort in a memory task. If men are supposed to be better at something (e.g., instructions to change a tire) women may do worse and men better because of the set expectation (Herrmann et al., 1992). In Ceci and Bronfenbrenner’s (1985) study, children had to remember to complete a certain task 30 minutes later; boys were better at remembering to check a battery charger and girls were better at remembering to check the oven. When tasks and memory are stereotyped, the amount of effort given is influenced – participants may reduce effort if they believe they are ill-suited to the task. Again, then, self-fulfilling prophecies may have a role in whether men or women have better memory for a given task. While self-fulfilling prophecies are discussed in depth below, the current study proposes to also check for a main effect of participant sex, but no specific finding was hypothesized. Thus:

**Research Question:** Will a main effect of participant sex will be found for memory accuracy in participants asked to remember a fictional crime they have witnessed?

### Personality (Conscientiousness) and Memory

Personality is defined as “an individual’s characteristic mode of thinking, feeling, and acting” (Terry, 2006, p. 382). Some research has examined how personality is related to memory. For example, Howarth (1969) looked at the traits of introversion and extroversion and found that introverts will do

worse than extroverts if there is too much arousal (e.g., a distracting environment). However, one personality trait that has not been investigated in terms of its association with memory is conscientiousness. People high in conscientiousness have characteristics such as being well-organized, efficient, and dependable (Goldberg, 1990). These very characteristics seem extremely relevant to the world of eye-witness testimony to crimes. Given how persuasive eyewitnesses are to jurors in this setting, highly dependable people with high attention to detail might be ideal witnesses – but almost no research has studied this association. Thus:

**Hypothesis 2** was that conscientiousness and memory accuracy will be positively correlated.

### Self-Fulfilling Prophecy and Memory

Recall that self-fulfilling prophecy is any expectation, positive or negative, about a circumstance or event that can influence the direction of one's behavior and thus make the expectation more likely to come true. Archibald (1974) explains several possible causes of self-fulfilling prophecies including the placebo effect, anxiety distraction, defense effort, false feedback, and dissonance anxiety reduction. For example, when using defense effort, one sets low goals so it is easier to achieve something (when one expects success) or sets high goals to blame performance on the high standards (when one expects failure).

One type of self-fulfilling prophecy is the Pygmalion effect, or when higher expectations lead to increases in performance (Dvir, Eden, & Banjo, 1995). Many studies have looked at Pygmalion effects on expectations of others (e.g., Dvir et al., 1995; Eden & Ravid, 1982; Feldman & Prohaska, 1979; Natanovich & Eden, 2008; Sutton & Woodman, 1989). In these studies,

experimentally manipulated high expectations increased attitudes and performance. For example, in Natanovich and Eden's (2008) study, supervisors were assigned to tutors and some supervisors were given high expectations of the tutors' performance; in the end, tutors who were expected to do well received higher ratings than the control tutors.

Most studies on self-fulfilling prophecies focus on how expectations from one person influence the performance of a second person, such as a student or employee. Few studies, however, have focused on raising expectations of the self (e.g., Eden & Zuk, 1995). In one exception, researchers took men who had never been to sea before in a naval officer course out on the ocean. Before they went, some were told they would do well with seasickness. The results showed the men with a low expectation of seasickness reported experiencing less seasickness than the others. While this single study indicates that self-fulfilling prophecies can have an impact on self-driven perceptions and performance, few studies exist to support this claim or to replicate the general finding. The current study thus proposed to experimentally examine the influence of self-fulfilling prophecies on self-expectations in the context of eyewitness memory. In the current study, participants were primed with an article about memory accuracy either stating that men are better or that women are better at being eyewitnesses, establishing their expectations and prophecies. Thus:

**Hypothesis 3** was participants who were primed to have high expectations for memory accuracy would, in fact, have better memories, compared to participants who were primed to have low expectations.

## Method

### Participants

Sixty-six participants were removed from the study either because they had already taken another eyewitness survey in the last six months (and therefore may have already seen the experimental materials) or failed to complete a majority of the survey. The final sample ( $n = 189$ ) was 55 (29.1%) men and 134 (70.9%) women. Race was as follows: 84.66% White, 2.65% Black, 1.59% two or more races, 1.06% Latino, 0.53% Asian, and 9.52% “other” or declined to answer. Age ranged from 18 to 89.5 years ( $M = 40.43$ ,  $SD = 17.95$ ). Participants were recruited through social media (e.g., Facebook) as well as introductory psychology courses at a small, Midwestern, private college. In addition, two social organizations for senior citizens sent the survey’s URL out to their members, asking volunteers to complete the study. Participants recruited through courses were given extra credit, at the professor’s discretion, for their participation; all others were simply thanked for their time.

### Predictor Variable: Conscientiousness

**Conscientiousness.** Conscientiousness was measured using the scale from Goldberg (1992). Participants rated 20 items on a 9-point scale (1 = *Extremely Inaccurate*; 9 = *Extremely Accurate*). Ten of the twenty items were reverse scored, then all the items were averaged. Possible scores could range from 1-9; higher scores mean higher levels of conscientiousness. Some of the items include “efficient,” “neat,” and “careful.” Some of the reverse-scored items include “disorganized,” “inconsistent,” and “impractical.” The average score of this sample was 6.66 ( $SD = 1.07$ ). Internal consistency for this scale was good,  $\alpha = .91$ .

Independent manipulation	Variable:	Article
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Participants read a self-fulfilling prophesy article written (in a similar style to that of Diekmann & Goodfriend, 2006) by the authors of the current study that indicated either (1) men or (2) women are better at eyewitness memory accuracy (randomly assigned). This manipulation was to test self-fulfilling prophesy effects on memory accuracy. The article (male condition) is available in Appendix A.

### Dependent Variable: Memory Accuracy

Memory accuracy was measured through questions based on the video participants watched. There were 21 questions and each question was multiple-choice. The video was taken from YouTube and edited for the purposes of the project; the authors requested permission to use the video from the person who originally posted it online. The video lasted about 45 seconds and shows a young woman walking through a city scene. She is then attacked by a young man who was waiting on a moped. The man and the woman struggle for a few seconds, and he then steals her purse and flees the scene. Examples of specific details tested were, “What were the colors of the perpetrator’s moped?” and, “What color was the victim’s purse?” Answers were scored such that a correct answer gave the participant one point, and incorrect answers resulted in zero points; thus the possible range of scores was 0-21. The mean for this sample was 13.42 ( $SD = 2.69$ ).

### Procedure

All participants were asked to go to a URL for the survey provided by the software company PsychData, which offered all survey materials online. Participants first read basic consent information. At the bottom of that screen, they were asked to click on “yes” if they wished to participate. If they tried to skip this question or if they clicked “no,” they were not taken to the rest of the materials.

Next, participants saw all the materials which included, in order: demographics, the self-fulfilling prophecy article, the video of the fictional crime, the memory test, and the conscientiousness scale (Goldberg, 1992). Finally, all participants were taken to a screen that stated the survey was completed and provided a short debriefing. This study was approved by the hosting university's Institutional Review Board.

## Results

### Hypothesis 1

Hypothesis 1 was that there will be a negative correlation between age and memory accuracy when adults are asked to be a witness in a “real world” type of scenario portraying a crime. To test this hypothesis, participants were equally split into age groups of 18-26 years ( $n = 65$ ), 27-51 years ( $n = 66$ ), and 52 years and over ( $n = 58$ ).

The memory scores for each group were as follows:  $M = 13.97$  ( $SD = 2.66$ ) for ages 18-26,  $M = 13.82$  ( $SD = 2.39$ ) for ages 27-52, and  $M = 12.34$  ( $SD = 2.78$ ) for ages over 52. These group differences were significant,  $F(2,186) = 7.16$ ,  $p = .001$ . The overall correlation between age and memory accuracy was also negative and significant,  $r(187) = -.34$ ,  $p < .001$ . To further explore this hypothesis, correlations between age and memory were also calculated for each of the three age groups. For the youngest group, age and memory were not associated with each other,  $r(63) = .06$ ,  $p = .669$ ; in other words, there was no memory difference for an 18 year old versus a 27 year old. However, for the two older age groups, as age increased, memory declined. For the middle-aged group, the correlation was significant and negative,  $r(66) = -.36$ ,  $p = .003$ ; the same was true with the oldest group,  $r(58) = -.40$ ,  $p = .002$ . Results for this supported hypothesis are shown in Table 1.

### Research Question

The research question was: Will a main effect of participant sex be found for memory accuracy? A t-test found that women ( $M = 13.65$ ,  $SD = 2.58$ ) had slightly higher memory scores than men ( $M = 12.85$ ,  $SD = 2.88$ ), and it was marginally significant,  $t(187) = -1.86$ ,  $p = .065$ .

### Hypothesis 2

Hypothesis 2 was that conscientiousness and memory accuracy will be positively correlated. As expected, there was a significant positive correlation between conscientiousness and memory scores,  $r(179) = .15$ ,  $p = .046$ , supporting Hypothesis 2.

### Hypothesis 3

Hypothesis 3 was that participants who are primed to have high expectations for memory accuracy will have better memories, compared to participants who are primed to have low expectations. Results showed that memory scores for participants in the high expectations condition (in other words, their participant sex matched the sex considered to have better memory in the article;  $M = 13.48$ ,  $SD = 2.62$ ) did not significantly differ from memory in the low expectation group (a mismatch of participant sex and sex highlighted in the article as having good memory;  $M = 13.33$ ,  $SD = 2.75$ ),  $t(186) = .39$ ,  $p = .700$ . Thus, Hypothesis 3 was not supported.

## Discussion

Results for Hypothesis 1 showed that there was a negative correlation between age and memory. In the age breakdowns, memory scores were negatively correlated with the age groups 27-52 and 52 and over, but not for 18-26 year olds. This means that there were no differences in memory found between an 18 year old and a 26 year old, indicating that age does not matter for memory accuracy in young adults. The results of the Research Question about participant

sex and memory showed that women had a slightly better memory, but only at a marginal level. However, this marginal difference might translate into better memory for a single fact from a crime, and this single piece of information could be the deciding factor in a court case.

Hypothesis 2, involving conscientiousness and memory, was supported by showing that the two variables were positively correlated. Someone who is higher in conscientiousness (e.g., well-organized, pays close attention to detail) is more likely to have a more accurate memory when recalling an event. Finally, results for Hypothesis 3 showed that participants primed to do better on the memory test did not differ from those who were primed with low expectations. The men who read the article “men are three times better at memory” did not significantly differ from women who read the same article and vice versa, going against some previous research (e.g., Eden & Zuk, 1995).

### **Strengths**

One of the most important aspects of the research was a wide-range of ages across participants and the total number of participants. Having a large sample size helps to closer estimate overall memory scores and relationships between all variables. The even distribution among age groups was essential to compare “older” to “younger” adults. In addition, the video of the crime was approximately 45 seconds. Crimes in the “real world” can happen quickly, and this short time period can relate the actual amount of time that witnesses have to process an event.

### **Limitations and Future Research**

Participants in this study were mostly White, so statistics on race were not valid. In addition, while statistical comparisons of men versus women did reach marginal significance, the imbalance of sample sizes

(fewer men compared to women) was not ideal. The procedure itself may also have led to some issues due to the interface of the PsychData software. This online program allows participants to view the video of the crime, and it is possible for people to pause or even re-watch the video before moving on. Participants may have done this in spite of explicit instructions that doing either of these things would decrease the validity of the study. Only participants who were recruited from university courses and took the survey under more controlled (and observed) conditions definitely saw the video only once. Thus, while the study had the benefit of an experimental design, controls typically found in a laboratory experiment may have been compromised.

Finally, a limitation may have been a weak experimental manipulation with the priming articles for men’s and women’s expectations. For future research, it would be interesting to consider ways to individually prime participants to make a more believable manipulation. For example, participants could take a “pre-test” that resulted in a response such as “You have a great memory” or “You have a bad memory.” In this study, the use of gender as a priming variable may not have been strong enough to elicit the self-fulfilling prophecy effect. Many studies have used the Pygmalion effect (high expectations leads to better performance) on expectations of others (e.g., Feldman & Prohaska, 1979; Natanovich & Eden, 2008; Sutton & Woodman, 1989), but little research has explore this effect on the individual. Additional research on the nuances of self-fulfilling prophecies and expectations regarding memory seems warranted.

### **Conclusion**

This study showed that memory for eyewitness events can be influenced by age,

conscientiousness, and perhaps participant sex. Overall, it seems that the best witness would be a female between the ages of 18 and 26 who is high on conscientiousness. Personality traits as well as characteristics of a witness are important factors to study when researching memory accuracy of events, as well as how different kinds of witnesses may influence jury decisions. Both the fields of psychology and criminology could benefit from this study, which provides insight into witnesses and what variables predict the most accurate memory.

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## Appendix

Table 1: *Correlation Between Age and Memory*

Variable	<i>n</i>	<i>r</i>	<i>p</i>
All ages	189	-.34	<.001
Age 18-26	65	.06	.67
Age 27-51	66	-.36	.003
Age 52+	58	-.40	.002

*Note.* All groups except 18-26 years had strong, negative, significant correlations between age and memory. As age increased, memory accuracy scores decreased.